25 NINA Project report

Environmental Impact Assessment (EIA) training course as part of the TAWIRI - NINA collaboration

Eds:
Jørn Thomassen
Cassian T. Mumbi
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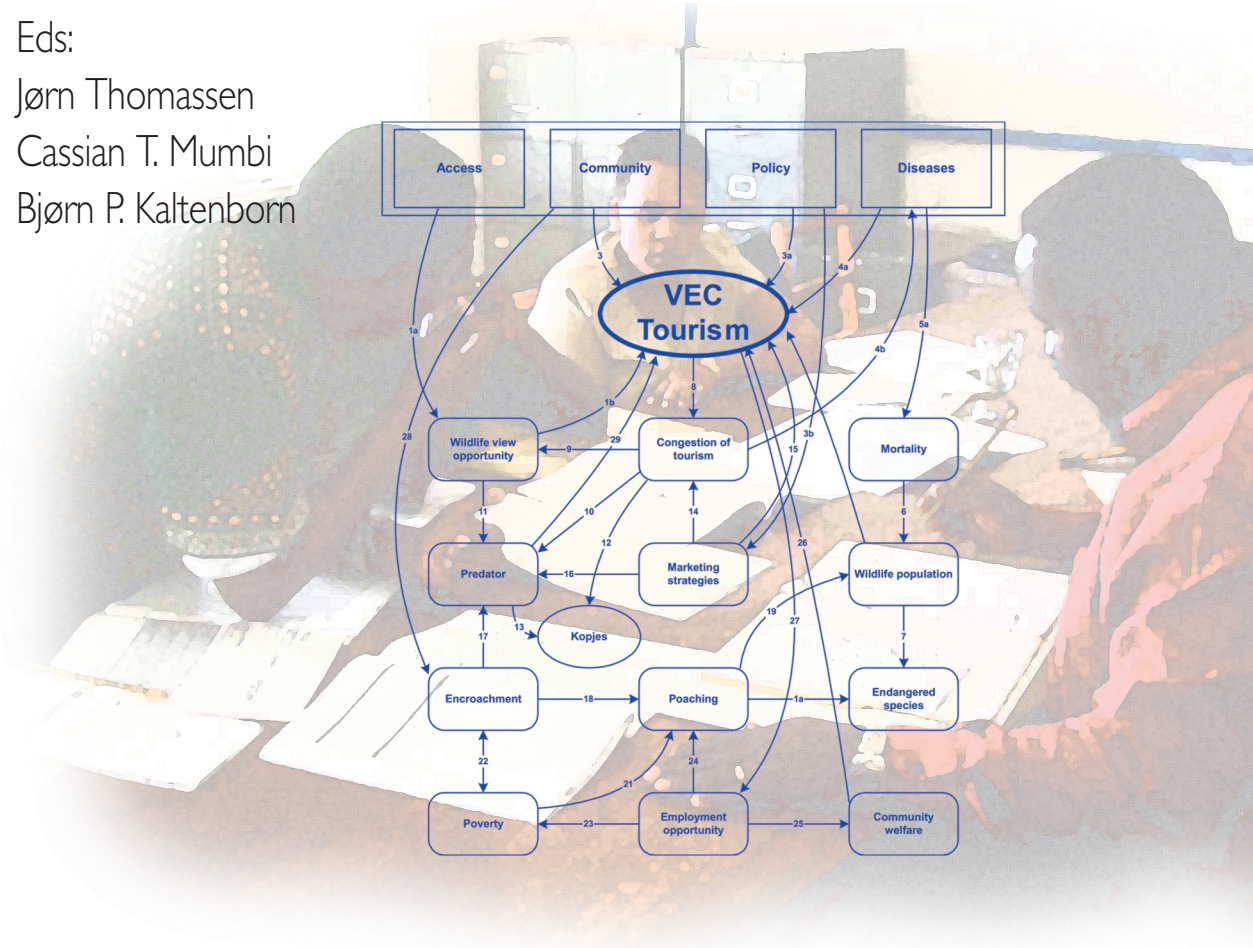
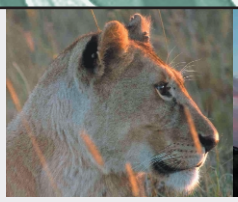
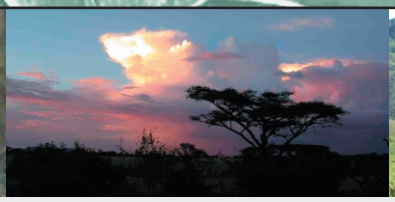
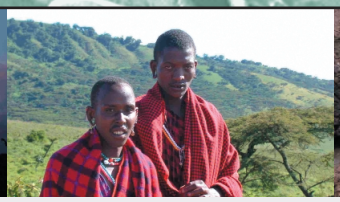


TAWIRI - NINA collaborative programme in capacity building


WILDLIFE ENVIRONMENTAL CHANGE CULTURE BIODIVERSITY

Cooperation and expertise for a sustainable future

NINA **Norwegian Institute for Nature Research**

Environmental Impact Assessment (EIA) training course as part of the TAWIRI-NINA collaboration

Conducted at Serengeti Wildlife Research Centre, April 22-26, 2002

Eds:
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TAWIRI - NINA collaborative programme in capacity building

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Som et ledd i samarbeidsprogrammet i kapasitetsbygging (2002-2006) mellom Tanzania Wildlife Research Institute (TAWIRI) og NINA er det gjennomført et kurs for TAWIRI ansatte i Environmental Impact Assessments (EIA – konsekvensutredninger). Denne rapporten oppsummerer kurset, inkludert den teoretiske plattformen, en step by step prosedyre for gjennomføring av EIA etter Adaptive Environmental Assessment and Management (AEAM) metoden, samt resultatene fra selve kurset.

Nøkkelord: Konsekvensutredninger, scoping, Adaptive Environmental Assessment and Management, kapasitetsbygging, samarbeid

Abstract

Thomassen, J., Mumbi, C. T. & Kaltenborn, B. P. (eds.) 2003. Environmental Impact Assessment (EIA) training course as part of the TAWIRI – NINA collaborative programme in capacity building. NINA Project Report 25. 34pp.

This publication is part of the reporting from the TAWIRI – NINA collaborative programme in capacity building (2002 – 2006). One of the targets in this programme is to provide TAWIRI with an overview and a basic knowledge in Environmental Impact Assessment (EIA) to be prepared to carry out EIAs themselves in the future. The purpose of this report is to give a brief overview of the training course, including the theoretical platform, a step by step procedure when using the Adaptive Environmental Assessment and Management (AEAM) approach in the EIA, and summarise the results from the training course.

Keywords: Environmental Impact Assessment, scoping, Adaptive Environmental Assessment and Management, capacity building, collaboration
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Foreword

This publication is part of the reporting from the TAWIRI – NINA collaborative programme in capacity building (2002 – 2006). One of the targets in this programme is to provide TAWIRI with an overview and a basic knowledge in Environmental Impact Assessment (EIA) to be prepared to conduct EIAs themselves in the future. The purpose of this report is to give a brief overview of the training course, including the theoretical platform, a step by step procedure when using the Adaptive Environmental Assessment and Management (AEAM) approach in the EIA, and summarise the results from the training course.

The EIA training course is part of the collaboration between NINA and Tanzania Wildlife Research Institute (TAWIRI). The two institutes co-operate on several fronts ranging from institutional capacity building to field research.

TAWIRI is the central wildlife research agency in Tanzania, and as such mandated to carry out and co-ordinate research within and outside the protected areas as well as conducting EIAs in Tanzania. To be able to fulfil its mandate TAWIRI needs to increase their capacity and skills in planning and conducting research and Environmental Impact Assessments (EIA).

Funding for the capacity building collaborative programme (2002-2006), which includes the EIA training, is provided by NORAD. We wish to thank the staff at Serengeti Wildlife Research Centre who made the training course to a successful event. We also will give honour to the participants who showed strong willingness to seek new information and learn about the EIA fundamental principles, process and approach.

It is our hope that that the training course and this report will be the starting point for TAWIRI to be able to conduct EIAs, and also to develop their own institutional EIA guidelines and skills adapted to the EIA practice and future EIA legislation in Tanzania.

Trondheim, Norway, 10.11.03

Jørn Thomassen

Table of contents

List of acronyms

AEAM	Environmental Assessment and Management
EIA	Environmental Impact Assessment
FBD	Forestry and Beekeeping Division
GNP	Gross National Product
IH	Impact Hypothesis
MNRT	Ministry of Natural Resources and Tourism
NCAA	Ngorongoro Conservation Area Authority
NGO	Non Governmental Organisation
NINA	Norwegian Institute for Nature Research
NP	National Park
SENEPA	Serengeti National Park
SWRC	Serengeti Wildlife Research Centre
TANAPA	Tanzania National Parks
TAWIRI	Tanzania Wildlife Research Institute
TEK	Traditional Ecological Knowledge
VEC	Valued Ecosystem Component
VSC	Valued Social Components
WD	Wildlife Division

Executive summary

As part of the capacity building collaboration between Tanzania Wildlife Research Institute (TAWIRI) and Norwegian Institute for Nature Research (NINA), a training course in Environmental Impact Assessment (EIA) was held at the Serengeti Wildlife Research Centre (SWRC) premises in the Serengeti National Park, for 5 days from April 21 – 26, 2002. Thirteen staff from TAWIRI, one from Tanzania National Park Authorities (TANAPA) and one from the Ngorongoro Conservation Area Authority (NCAA) attended the course. The trainers/facilitators were Jørn Thomassen and Bjørn P. Kaltenborn from NINA; with assistance from Kari Helene Bachke Andresen, Norway.

The course was intensive, covering introduction to EIA, general principles of EIA, EIA legislations, guidelines and policies in the country, and the quality of Environmental Impact Assessment in the European Union. Emphasis were put on scoping in the EIA process by using the methodological approach Adaptive Environmental Assessment and Management (AEAM), were priorities, selections and documentation with regards to decision-making are the main elements. The AEAM approach is based on workshop(s) were different stakeholders participate. The training course was organised in working groups with subsequently plenary presentations of the results, and subsequent discussions and conclusions. The basic ideas in AEAM is to give priority to Valued Ecosystem Components (VECs), which are the components to be focused on in an EIA for a specific development. For each VEC a Schematic Flow Chart is constructed, a set of Impact Hypotheses (IHs) identified and evaluated, and finally, several recommendations given concerning further investigations, research, managing actions and mitigating measures.

For practical purposes, the case study of Tourism in the Serengeti National Park, Tanzania was used. Using the case study, impact factors on the environment, natural resources and the society were served.

This report gives a summary of the training course and is divided into three parts:

- Part A deals with the theoretical platform for the course;
- Part B describes a step by step procedure when using the AEAM approach in the EIA; and
- Part C summarise the result from the different group works in the training course.

It is a hope that the training course and this report will be the starting point for TAWIRI to be able to conduct EIAs, and also to develop their own institutional EIA guidelines adapted to the EIA practice and future legislation in Tanzania.

PART A: Theoretical platform

1. Introduction

Tanzania Wildlife Research Institute is a Governmental Organisation whose role is to co-ordinate and carry out wildlife research in Tanzania, and advice relevant management authorities on sustainable conservation of wildlife resources in their respective areas.

The principal stakeholders for TAWIRI include the Ministry of Natural Resources and Tourism (MNRT), Wildlife Division (WD), Tanzania National Parks (TANAPA), Forestry and Beekeeping Division (FBD) and Ngorongoro Conservation Area Authority (NCAA). The stakeholders' premises are proving to development projects/activities, which require Environmental Impact Assessment (EIA) from time to time. Such activities include impacts from different encroachments, for example building construction of tourist hotels, campsites, office premises, staff quarters, roads etc.

For a long time in the past, the development projects in Tanzania were done without EIA, or by hiring expertise from other organisations and institutions than TAWIRI. The reason for this was that TAWIRI had not trained personnel to conduct EIAs or in position to bid for EIAs. The situation is now changed and TAWIRI has enough personnel with required qualification to be trained in EIA. Norwegian Institute for Nature Research (NINA) has expertise and experience in planning and conducting EIAs, and it was found appropriate to include EIA training as part of the capacity building collaboration between NINA and TAWIRI.

The EIA training course was conducted at Serengeti Wildlife Research Centre in the Serengeti National Park, from April 22 to 26, 2002. The premises were the most ideal for the case study, which was "Tourism in the Serengeti National Park, Tanzania".

There were 15 course participants including 13 from TAWIRI, 1 from Ngorongoro Conservation Area Authority and 1 from TANAPA.

2. Environmental Impact Assessment as a management tool

The Environmental Impact Assessment can be defined as a formal study process used to predict the environmental consequences of a proposed major development project. It aims to ensure that potential problems are foreseen and addressed at an early stage in the project's planning and designing. In order to achieve this, the assessment findings are communicated to all various groups who will make decisions about the proposed project; the project developers and their investors, planners and politicians.

Like economic analysis and engineering feasibility studies, EIA is a management tool for officials and managers who must make important decisions about major development projects. All developers are familiar with economic and engineering studies. These tools provide the basis for designing robust, economically and viable projects. EIA is now seen as an equally important tool in designing a viable project.

In recent, major projects have encountered serious difficulties because insufficient account has been taken of their relationship with the surrounding environment. Some projects have been found to be unsustainable because of resource depletion. Others have abandon because of public opposition, financially encumbered by unforeseen costs, held liable for damages to natural resources and even been the cause of disastrous accidents. Given this experience, it is clearly very risky to undertake, finance, or approve a major project without first taking into account its environmental (and social) consequences and then planning and designing the project so as to minimise adverse impacts.

Guidelines for conducting EIAs in Tanzania have been worked out by the Institute of Resource Assessment, Dar es Salaam, Tanzania in collaboration with the International Institute for Environment and Development, UK, but there are no EIA legislation implemented in Tanzania yet.

3. General principles of EIA

Generally and simply spoken, EIA can be thought of as a data management process with three main components (Wathern 1988):

1. The identification (and possibly collection) of appropriate information necessary for different decisions to be taken.
2. Potential changes in environment and society caused by the implementation of the project must be assessed and compared with the situation without the project (0-alternative).
3. Actual change must be recorded and analysed.

4. The EIA process

The EIA process vary slightly from country to country, but a general picture of the process and principles can nevertheless be generated (Figure 1).

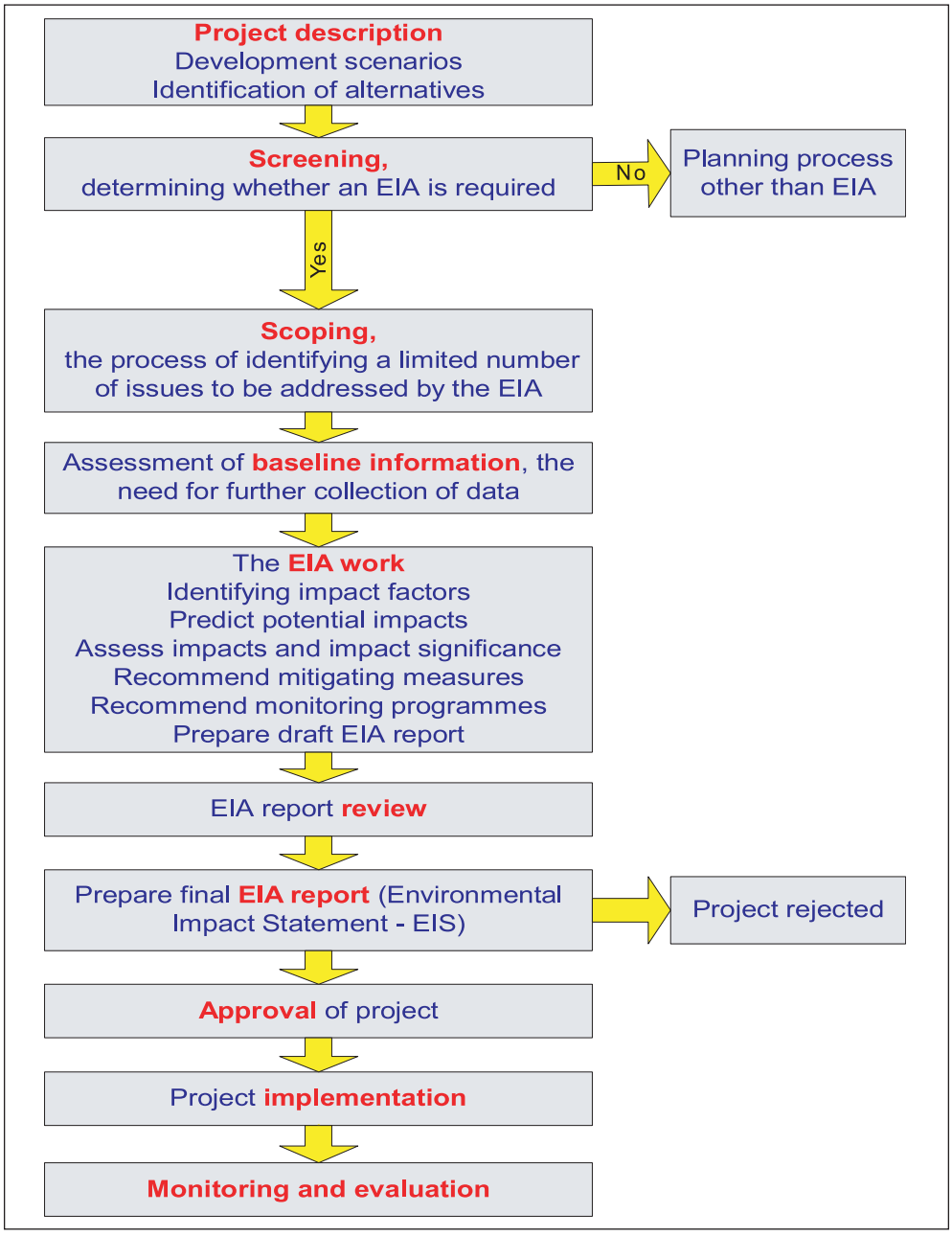


Figure 1.
A simplified picture of the EIA process.

5. Case study description: Tourism in Serengeti N.P.

Why tourism?
There are many definitions of tourism.

- Going away from home for leisure, recreation.
- Generally domestic and international travel to experience nature and culture.
- Tourism is the largest domestic industry in the world, second only in global spending to the military industry.
- Nature-based tourism is the fastest growing segment of international tourism with a growth in turnover and volume of approx. 10 per cent annually.

Tourism is a highly dynamic social and economic system. Important approaches include:

- Socio-economic issues
- Cultural issues
- Market studies, and the economics of tourism
- Ecological issues, environmental impacts

Tourism is a mirror of a society. Some critics claim that tourism cannot be sustainable because society itself is not sustainable. Tourism in East Africa is a critical factor in the national economy, but it is also a complex and fragile system, subject to global economic fluctuations and political instabilities.

Figure 2.
When a charismatic animal (in this case a leopard) is detected, congestion of tourists can reach high levels.
Photo: J. Thomassen.

Tourism in Serengeti N.P. – what to look at?
Serengeti National Park (SENAPA) was gazetted to a National Park 50 years ago. Year 2001 revenue collection on tourism in SENAPA totalled to USD 6 million.

Main question: What will be the future of tourism in Serengeti? What will happen in 10 years from now? Which subjects/factors are important to consider?

- Changes in tourism patterns, increased demand for quality experiences (interpretation guides, facilities, domestication tourism)
- Infrastructure development (lodges, roads etc.)
- Strengthening private sector
- Political instability in East Africa
- Increasing poverty – community relations - benefit sharing
- Security concerns – technical and communication infrastructure
- Relationships between science and tourism
- New ecotourism products
- Changing roles of managers: from police to service
- Environmental requirements/certification of managers and science
- Re-introduction of species and diseases.

Serengeti National Park is one of the most famous wildlife parks in the world, and has a long tourism history. Tourism visitation and revenue is critical for maintaining the operating budget of the park. At the same time, little is known about the type, magnitude, and extent of environmental impacts as well as the quality of hospitality management and the visitor experience. The management zone plan of the park specifies a large number of tourism management objectives in the areas of access/development, visitor use/experience, park operations and development, relations and benefits to surrounding local communities, cultural resources, and natural resources. The main purpose of the park is to preserve a unique wilderness type ecosystem and promote sustainable nature-based tourism. This will require increased knowledge about the various facets of the tourism system as well as the environmental impacts.

Figure 3.
One of the more popular species to watch and photograph is the leopard.
Photo: J. Thomassen.

6. The Adaptive Environmental Assessment and Management (AEAM)

One major challenge in EIA is to identify a limited number of issues to be addressed by the EIA (Beanlands 1988). This process is called scoping and will normally include considerations of impact factors and potential impacts, decision makers, stakeholders, alternatives, access of baseline information, time schedule and also economic frames. The scoping phase in EIA is furthermore critical for an optimal use of limited resources in the perspective of personnel, time and economy, and should be accomplished as early as possible in the process.

One approach is to use an adjusted form of the Adaptive Environmental Assessment and Management (AEAM) concept (Holling 1978, Hansson et al. 1990, Thomassen et al. 1996, 1998). As an EIA normally shall cover various subjects concerning environment , natural resources and society, different actors and stakeholders will be involved in different phases of the process. Obviously, communication between decision makers, authorities, management, public, consultants and scientists should be accomplished in a very early stage of an EIA, with the objective to scope on important issues in each specific EIA context. AEAM is a participatory process, based on work shops attended by different stakeholder and project holders.

In AEAM the impact predictions and significance includes the selection and priority of VECs (Valued Ecosystem Components), which can be affected by the development activities. Further, to point out major linkages between the different components in the system, by preparing Schematic Flow Charts, and the impact factors by defining and describing (IHs) (Impact Hypotheses) (see Figure 4). Key statements in every scientific work, as well as in EIA, should be the possibilities to document and control the process and the choices done. It should be obvious that an open and well-documented process is essential when numerous subjects are rejected as not important enough.

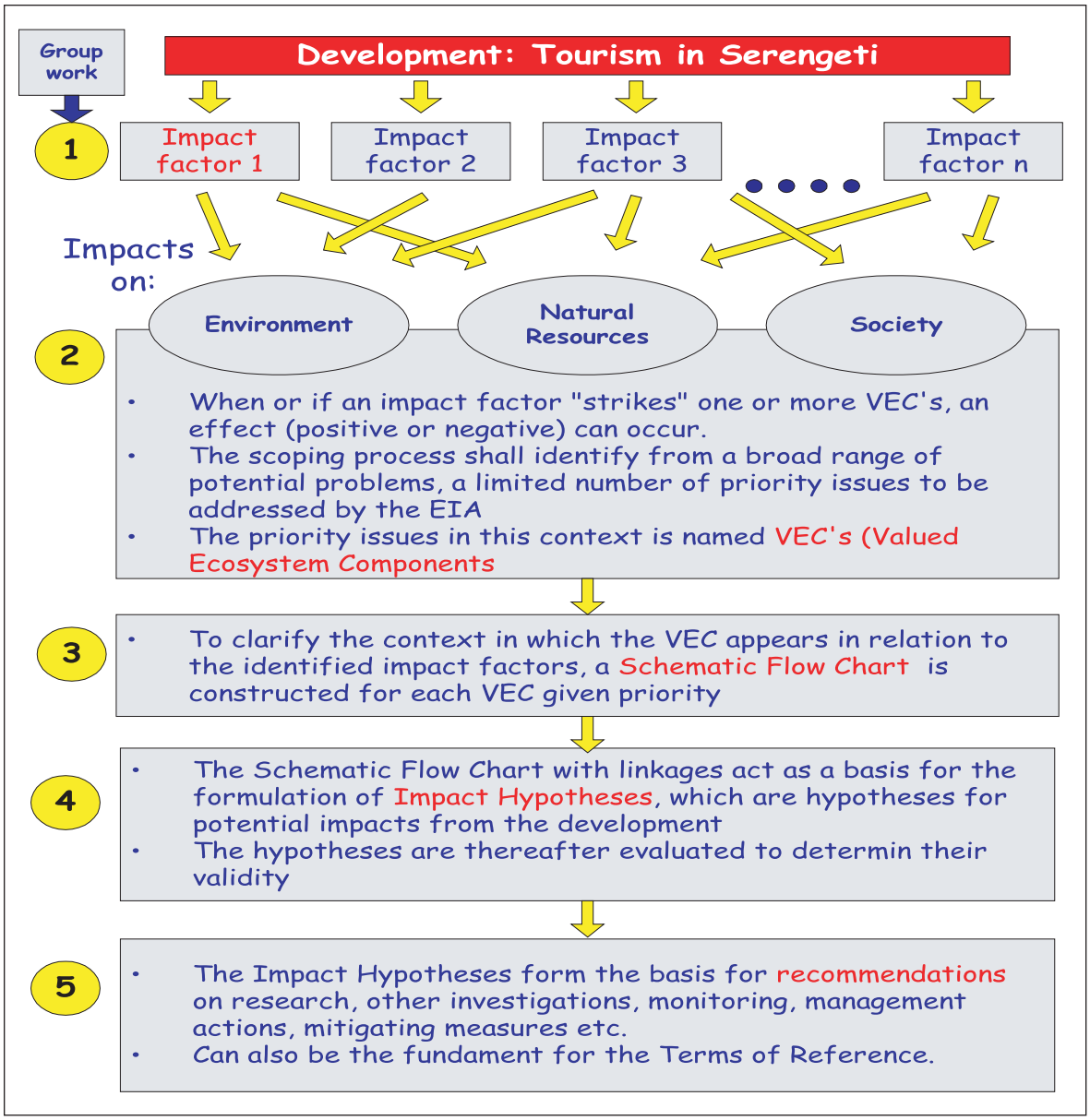


Figure 4.
Schematic picture of the different steps in the AEAM approach used in scoping. Case study is tourism in Serengeti NP, Tanzania.

Valued Ecosystem Components (VECs)

A *Valued Ecosystem Component* is defined as *a resource or environmental feature that: is important (not only economically) to a local human population, or has a national or international profile, or if altered from its existing status, will be important for the evaluation of environmental impacts of industrial developments, and the focusing of administrative efforts* (Hansson et al. 1990).

The selection of VECs is probably the most important and at the same time the most difficult step in the process of selection and focusing in the EIA. The critical point is to focus on decision-making, and the VEC concept therefore also should include social, political and economical qualities. Moreover, there are only rooms for a limited number of VECs, which in turn call for high critical sense in the selection process.

In the EIA work carried out in the Beaufort Sea Region in Canada (see Indian and Northern Affairs Canada 1992a,b, 1993) the social components of the EIA are treated by defining and describing so-called Valued Social Components (VSC) in addition to the VECs. The society is clearly an important part of the EIA, and the society-based concerns in the development can be assessed through a clearly defined process, for example by definitions of VSCs.

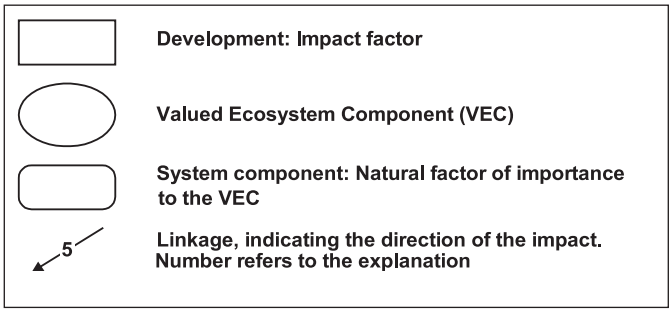
Schematic Flow Charts

A *Schematic Flow Chart* is a diagram of boxes and arrows indicating in which context each of the VECs appears. That means which type of impact from the proposed activity will affect the VEC and how. Each linkage shall be explained in a brief text following the chart. Hansson et al. (1990) described the content of the flow chart to include the main categories of the physical, biological and possibly also social and political factors influencing the VEC, so-called *system components*, and impacts from the planned activities, called *developments*.

The relationships between the components are called linkages, and so far we will not put great effort into the quantification of these linkages by means of for example energy flow, biomass, importance etc. It is however, important that each linkage in the flow chart is followed by a brief explanation. See Part C, chapter 3 in this report, showing examples of flow charts.

If all the connections between each VEC and the different components on primary, secondary, tertiary.... level should be included in the flow chart, a more or less chaotic picture would occur. Each flow chart, therefore, only comprises the components that are in direct contact with the VEC. The flow chart will form the basis for formulating I*mpact Hypotheses.*

When building up the flow chart we use the following symbols:



Impact Hypotheses (IHs)

An *Impact Hypothesis* is a hypothesis for testing the possible impact from the activity on the VEC. The impact hypothesis is based on the schematic flow chart and shall be explained and described preferably in scientific terms. The IH is also the basis for recommendations concerning research, investigations, monitoring and management actions, including mitigating measures.

The flow charts and the linkages indicate which activities will influence the VEC directly, or indirectly via the system components. By means of the linkages a series of impact hypotheses can be prepared for each VEC. All IHs shall be scientific documented if possible. At this stage of the process it is important to cover all the impacts that can affect the VEC.

Evaluation of Impact Hypotheses

After the preparation of the IHs, an evaluation procedure is accomplished for each IH, putting them into one of the following categories:

A. The hypothesis is assumed not to be valid.

B. The hypothesis is valid and already verified. Research to validate or invalidate the hypothesis is not required. Surveys, monitoring, and/or management measures can possible be recommended.

C. The hypothesis is assumed to be valid. Research, monitoring or surveys is recommended to validate or invalidate the hypothesis. Mitigating measures can be recommended if the hypothesis is proved to be valid.

D. The hypothesis may be valid, but is not worth testing for professional, logistic, economic or ethical reasons, or because it is assumed to be of minor environmental influence only or of insignificant value for decision making.

We use a standard diagram (See Part C, chapter 4 in this report for examples) when listing up the evaluated IHs, one diagram for each IH. In the active assessment system, only IHs placed in category B, C and sometimes D are brought forward to the assessment of impacts. Normally, the category C - hypotheses will be tested through research, monitoring or surveys, which also will reflect the different ongoing activities in the «Terms of Reference» for an EIA.

Moreover, it is important that all decisions are explained and that significant references for the decisions are given. In the EIA process it is of significant value to document the different steps and choices against the defined objectives.

Recommendations
As a consequence of the evaluation of the impact hypotheses, several recommendations conserning further investigations/ research (baseline), monitoring, management actions and migration measures are normally given.

Baseline studies
Beanlands (1988) states that baseline studies refers to the collection of background information on the environment and socio-economic setting for a proposed development project, and that a program on baseline studies can be designed around the results of a scoping exercise.

The needs for research, monitoring and/or surveying
To validate or invalidate the IHs, research, monitoring and/or surveying may be necessary. In this context it is important to bear in mind the "good enough" -principle and the relevance of decisions. It is also important to describe the needs for data and the methods to be used in testing the hypotheses.

The needs for management actions and mitigating measures
A natural part of an EIA will be to give recommendations concerning management actions and mitigating measures with respect to the proposed activities. It is important not to forget this in the early phase of the EIA-process, as this often will be the most important contribution from the EIA. Recommendations concerning revised plans to mitigate negative effects on the environment and on the society must be done in the early phase of the development.

7. Literature

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PART B: AEAM – Step by step

Step 1: Introduction (lecture in plenary)

Describe the principles of EIA and the AEAM process. Important aspects are:

- The Adaptive Environmental Assessment and Management (AEAM) approach is a participatory systematic method designed for work with EIA.
- The working method in AEAM is based on workshop(s) where different stakeholders participate, and where the participants alternate between group works and plenary presentations, discussions and conclusions.
- An experienced facilitator lead the process
- 2 to 4 groups with 4-8 members in each is normal and preferable.
- The group composition can change between mixed and professional according to the task of the group work.
- Normally the length of each group work vary between 1 and 2 hours.
- According to the size of the EIA, work shops normally last for 3-5 days.
- The participants should cover different stakeholder interests in the project, and normally include the local communities, NGOs, management authorities (local to national level), representatives from the project holder, professionals responsible for the EIA etc.
- With different stakeholders involved, the workshop process can contribute to achieve important results such as communication, awareness, ownership to the project and conflict reduction.
- With relatively short time available at each group work, the principal group work philosophy is that the most important and significant problems and solutions will be exposed during the process.

Step 2: Basic information: description of the project and of the potential affected environment and society (information given in plenary)

Describe the development plans as detailed as possible with emphasis on potential positive and negative factors concerning the environment, natural resources and the society. Be aware of the difference between the construction phase, the operating phase and the decommission phase.

Describe available baseline information concerning the environment, natural resources and society in the influence area, including the accessibility of the data and which format it is stored in. Be especially aware of protected areas, red list and threatened species, vulnerable habitats and biotopes and traditional ecological knowledge (TEK).

Identify the decision makers and the various decisions to be taken in the EIA process. Mapping of roles, actors and responsibilities in the process can be vital to ensure transparency and frankness.

Step 3: Identification of major impact factors (group work 1)

Objective: Identification and discussion of major impact factors from the development plans.

Approach: All groups work with the same task. Use the first minutes of the group work to be familiar with the development plans and the potential impacts and impact factors. Discuss the impact factors in the group, rank them with respect to importance and make conclusions. Explain why the selected impact factors are given priority. One of the group members are responsible for summing up and present the results in plenary. Use a standardised form for presentation.

Output: A set of potential impact factors with explanations from each group.

Estimated duration of group work: 1.5- 2 hours.

Figure 5.
Lodges and tented camps are established as part of the tourism infrastructure (Picture: Grumeti tented camp in the Western Corridor). The construction and activities in connection with this can also be assessed as an impact factor.
Photo: J. Thomassen.

Step 4: Plenary presentations, discussion and conclusions

Objective: To present the group work and make selection of major impacts factors from the development plans.

Approach: All groups present the results from group work 1 using overheads or PowerPoint, including explanations for the selections. Short session with comments and discussions after each presentation. The facilitator chair the plenary session and summarise the different suggestions, open for comments and discussions and present the total picture. Conclusions are made at the end of the session.

Output: Main impact factors to be used in the further assessments.

Estimated duration: Each group work presentation: 15 minutes including time for discussion. 15 minutes for summing up discussions and making conclusions.

Step 5: Identification of Valued Ecosystem Components (VECs) (group work 2)

Objective: Identification of major issues to concentrate on in the EIA.

Approach: The selected impact factors from group work 1 are brought forward and used as background information in group work 2. All groups work with the same task, namely the identification of a selected number of priority issues to be addressed in the EIA. This is probably the most challenging and difficult part of the scoping process. Use the first minutes of the group work to be familiar with the development plans, the impact factors and the VEC concept (use the definition of a VEC as a starting point). Discuss which issues (VECs) which most likely will form the basis for decision making concerning the encroachment, rank them with respect to importance and make conclusions consult with available literrature. Make a final selection of the most important VECs (10-15) and explain why the selected VECs are given priority and why others are rejected. One of the group members are responsible for summing up and present the results in plenary. Use a standardised form for presentation.

Output: A list of 10-15 VECs from each group. Several VECs will normally be identical in each group.

Estimated duration of group work: 2-4 hours depending of the development plans.

Step 6: Plenary presentations, discussion and conclusions

Objective: To present the group work and make selections of major VECs.

Approach: All groups present the results from group work 2 using overheads, or PowerPoint including explanations for the selections. Short session with comments and discussions after each presentation. The facilitator summarises the different suggestions, presents the total picture after the last group work presentation and opens for comments and discussions. It is important to chair the discussion and make conclusions on a selected number of VECs. A total of 10 – 20 VECs can be normative.

Output: 10-20 important VECs to be used in the further assessments. The VECs shall normally cover the environment as well as the society.

Estimated duration: Each group work presentation: 20 - 30 minutes including time for discussion. 30 minutes for summing up discussions and making conclusions.

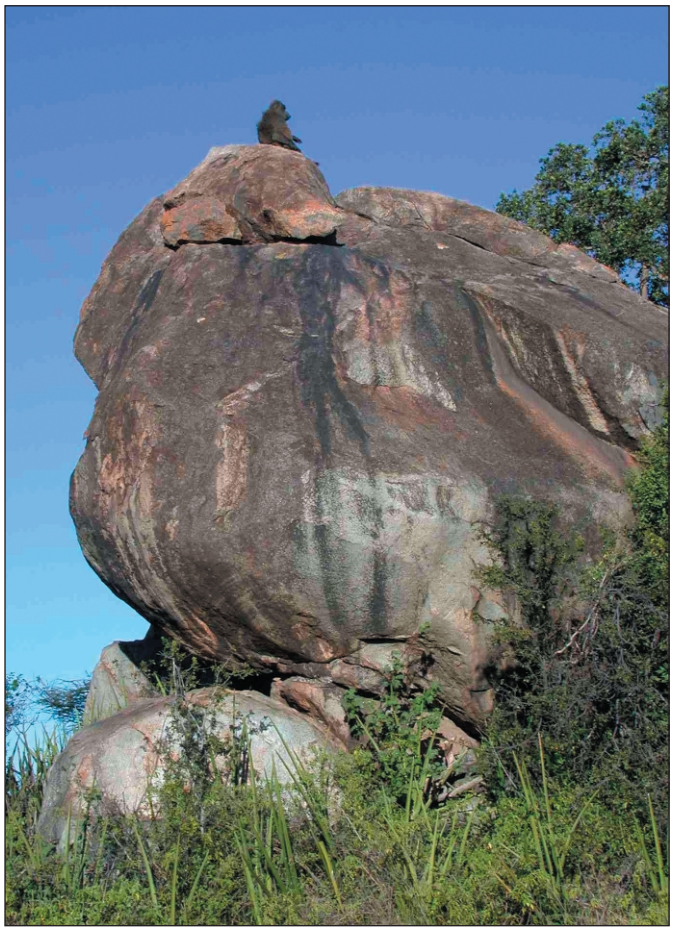


Figure 6.
Kopjes and the associated biodiversity can be assessed as a Valued Ecosystem Component.
Photo: J. Thomassen.

Step 7: Construction of Schematic Flow Charts (group work 3)

Objective: Construction of flow charts indicating in which context the VEC appears.

Approach: The selected impact factors from group work 1 are brought forward and used in group work 3. The VECs from group work 2 are divided between the groups. It is important that each group have some professional participants understanding the nature of the VECs in the group. At least one of the groups should concentrate on social issues. Use the first minutes of the group work to be familiar with the flow chart thinking. Discuss and select the major impact factors concerning each VEC. The most important impact factors from the development can have a direct impact on the VEC, an indirect impact via so called system components, or no impact at all. Start with one VEC (the one assessed as the most important in the group) and construct the flow chart. One schematic flow chart is constructed for each VEC. Each flow chart consists of a number of boxes and arrows indicating in which context the VEC appears. The linkages between impact factors and the VEC shall be followed by a brief explanation. One of the group members are responsible for summing up and present the results in plenary. Use a standardised diagram for presentation of the group work results.

Output: One Schematic Flow Chart for each of the selected VECs.

Estimated duration of group work: At least one hour for each flow chart. Be careful to serve coffee/tea!!

Step 8: Plenary presentations, discussion and conclusions

Objective: To present the group works and get an understanding of the context in which the VEC appears.

Approach: All groups present the results from group work 3 using overheads or PowerPoint, including explanations for the linkages. Short session with comments and discussions after each Schematic Flow Chart presentation. A workshop secretariat is recommended to be able to write down the final flow charts. The flow charts will form the basis for formulating impact hypotheses in group work 4.

Output: One Schematic Flow Chart for each selected VEC, including short explanations for each of the proposed linkages.

Estimated duration: 10-15 minutes for each flow chart including time for discussions and conclusions.

Step 9: Formulation of Impact Hypotheses (IHs) and evaluation of the IHs (group work 4)

The tasks in group work 4 can be conducted in one very long session (with several breaks), or split up in two parts within the same group work (as described below):

Part A:
Objective: Discuss and formulate a set of impact hypotheses from the impact factors on each VEC.

Approach: The same group composition as in group work 3. The most important impact factors from the development can have a direct impact on the VEC, an indirect impact via so called system components, or no impact at all. The explanations and the linkages from the flow charts indicate these impacts, and form the basis for the formulation of a set of impact hypotheses for each VEC. Since different stakeholders with different experience and knowledge concerning the VECs participate, it is important to include all hypotheses assessed as important in the group work. Each hypothesis shall be followed by an explanation, if possible based on scientific knowledge with citations, or on documented TEK . Due to shortage of time, it can be adequate to let each group work participant work with his/hers own set of hypotheses and discuss the results in the group before presentation. One of the group members are responsible for summing up and present the results in plenary. Use a standardised form for presentation of the group work results.

Output: A set of impact hypotheses for each VEC.

Estimated duration of part A of the group work: 2 - 4 hours depending on the development plans.

Part B:
Objective: Evaluate the proposed Impact Hypotheses by categorising them into one of four categories (A, B, C or D).

Approach: Each of the proposed IHs is evaluated with respect to validity, based on knowledge. Documentation is important and a rationale is given for each evaluation. One of the group members (the same as in part A?) are responsible for summing up and present the results in plenary. Use the same standardised form as in part A for presentation of the group work results.

Output: All IHs evaluated and categorised in one of for categories. Normally only IHs categorised in B or C is brought forward in the assessment system (but sometimes also category D hypotheses). The evaluated IHs form the basis for recommendations (group work 5) concerning research, surveys, monitoring and management actions, including mitigating measures.

Estimated duration of part B of the group work: 2 - 3 hours depending on the development plans.

Step 10: Plenary presentations, discussion and conclusions

Objective: To present the group works and get an understanding for all stakeholders of possible impacts from the development.

Approach: All groups present the results from group work 4 using the standardised form on overheads or PowerPoint. Short session with comments and discussions after each set of IHs for a VEC. The formulation and categorisation of the IHs will form the basis for different recommendations done in group work 5.

Output: A set of IHs for each VEC, evaluated and placed in one of four categories.

Estimated duration: 5-10 minutes for each IHs including time for discussions and conclusions.

Step 11: Recommendations (group work 5)

Objective: To make a set of recommendations for the proposed development.

Approach: IHs placed in category B or D are given priority. In a category C hypothesis further research or investigations is needed to validate or invalidate the hypothesis. In all categories recommendations concerning research, surveys, monitoring and management actions, including mitigating measures can be given. Remember that different stakeholders (also representatives from the client or the responsible for the development plans) should participate on the workshop, and thereby understand the recommendations given (agree or disagree). Each IH is treated carefully, and recommendations given where advisable. One of the group members are responsible for summing up and present the results in plenary. Use the same standardised form as in step 10 for presentation of the group work results.

Output: Several recommendations concerning different aspects of the development.

Estimated duration of the group work: One hour for each IH.

Step 12: Plenary presentations, discussion and conclusions

Objective: To present the group works and get an understanding for all stakeholders of different recommendations.

Approach: All groups present the results from group work 5 using the standardised form on overheads or PowerPoint. Short session with comments and discussions after each set of IHs for a VEC.

Output: Several recommendations given. The different recommendations can be grouped according to their nature and can form the basis for Terms of Reference, for Management Plans, for Monitoring Programmes or Mitigating Measure Programme.

Estimated duration: 5-10 minutes for each IHs including time for discussions and conclusions.

Summing up

A workshop secretariat is recommended to be able to sum up and write down the different results from the steps in the process. The preparation of a work plan and a time schedule for conducting the EIA is critical for the project success. Responsibilities (on personal level) and man hour estimation for the different activities should also be included in the work plan. The AEAM process could form the basis of the projects Terms of Reference. The context in which the AEAM approach is used in the EIA procedure is shown in Figure 7.

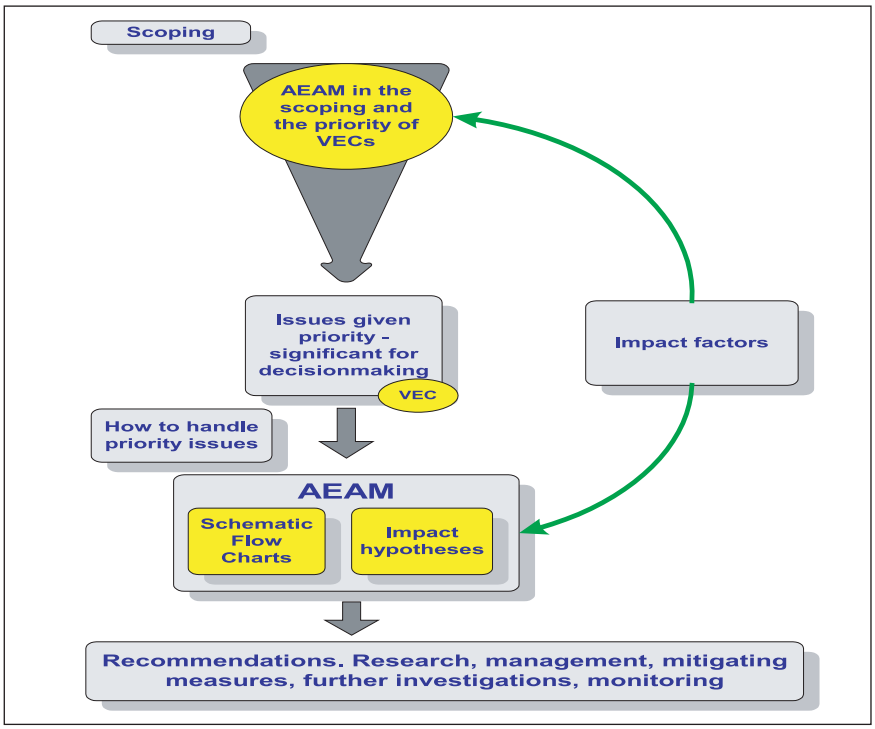


Figure 7.
The use of Adaptive Environmental Assessment and Management (AEAM) approach in an EIA.

PART C: Results from the training course

The training course was carried out by using the AEAM approach on tourism development in Serengeti N.P. AEAM is based on a workshop process, were the participants systematically works through the identification and selection of issues to be addressed in the EIA, and critically handle the issues with respect to potential consequences from the development, in this case the development of tourism in Serengeti N.P. See also Part B in this report for a step by step procedure of the AEAM approach.

The participants were distributed in three groups, working with the same tasks. The facilitators circulated between the groups giving supervision and advice. Each group selected one chair person and one secretary.

The results below are identical with the conclusions made at the seminar, and have not been changed or modified.

1. Identification of Impact Factors

Group no. 1

No.	Impact factor	Priority
1	Off-road driving	
2	More lodges	
3	Airstrips	
4	Visitors Centre	
5	Walking safaris	
6	Diseases	
7	New species	

Explanation for impact factors given priority (use additional sheets if necessary)

- Animal disturbance, habitat destruction and biodiversity loss
- Water disposal, pollution, change in animal behaviour and temporal
- distribution of primates
- Loss of biodiversity and habitat
- Increased in income generation
- Increased in GNP
- Reduced number of visitors and low GNP
- Reduced domestic tourism and increased poaching
- Wise utilisation of resources
- Animal mortalities
- Suppression of indigenous species

Literature:

Group no. 2

No.	Impact factor	Priority
1	Road construction	
2	Lodges construction	
3	Campsite construction	
4	Political immaturity	
5	Unstable ecosystems	
6	Diseases	

Explanation for impact factors given priority (use additional sheets if necessary)

Literature:

Group no. 3

No.	Impact factor	Priority
1	Improved and sustained local and national economies	
2	Increased congestion of tourists	
3	Effect on cultural values	
4	Improvement of infrastructure	
5	Increased pollution	
6	Loss of political and economical control by the Government	
7	Open more circuits for tourism	

Explanation for impact factors given priority (use additional sheets if necessary)

Literature:

Conclusions in plenary

After the group presentations and subsequent discussions in plenary, it was concluded to put emphasis and focus on wildlife with priority on the following impact factors, which will be used further on in the assessments of tourism in Serengeti N.P.:

Impact factors assessed as most important	Impact factors given priority
More accommodation facilities	
Heavy (increased) traffic and off-road driving	**Traffic**
Increased access	**Access**
Increased conflicts between local communities and park authorities	**Community conflicts**
Diseases	**Diseases**
Policy	**Policy**

2. Identification of Valued Ecosystem Components (VECs)

Group no. 1

Assessed VECs:	VEC - name	Given priority Yes/No
1	Seronera valley	1
2	Wildebeest migration	3
3	Increased viewing of the big five and prey species	5
4	Endangered/threatened species	4
5	Ecotourism	2
6	Kopjes – refugees to many wildlife	6

Yes: Explanation for VECs given priority (use additional sheets if necessary)

1. Lodges increase waste materials
   Location of lodges displaces animals
   Heavy traffic changes animal behaviour, accelerate soil erosion and increase siltation in the valley.
3. Attracts tourism whence results to habitat destruction and animal disturbance
5. Congestion of tourists and traffics in one area, thence habitat destruction, disturb animals and change in animal behaviour.
4. These are good tourist attractants and most of them are sensitive to pressure and are shy
2. Increased demand for ecotourism will affect biodiversity in the area.
6. Increase in tourists circuits.

No: Explanation for VECs not given priority (use additional sheets if necessary)

Literature:

Group no. 2

Assessed VECs:	VEC - name	Given priority Yes/No
1	Wildebeest migration	1
2	Open grasslands	2
3	Serengeti Woodlands	3
4	Large predators/prey populations	4
5	Grumeti/Mara River Systems	5
6	Springs, permanent water surfaces and catchment areas	6
7	Keystone species (Elephants)	7
8	Seronera valley	8
9	Serengeti Kopjes	9
10	Endangered/Threatened species	10
11	Endemic species in Serengeti National Park	11
12	Culturally-valued species	12

Yes: Explanation for VECs given priority (use additional sheets if necessary)

1. Wildebeest migration
   Unique phenomenon
   Important in nutrients cycling and energy flow in ecosystem
2. Open grassland and plains
   Important during calving for wildebeest (Ca^{++}, K^{+})
   Food and habitat for migratory animals during wet season.
3. Woodland of Serengeti
   Important food and habitat for migratory and other animals during dry season
4. Catchment areas

No: Explanation for VECs not given priority (use additional sheets if necessary)

Literature:

Group no. 3

Assessed VECs:	VEC - name	Given priority Yes/No
1	Wildebeest migration	1
2	Buffer zones soft borders	2
3	Seronera valley	3
4	Water dynamics and quality	4
5	Large predator populations	5
6	Endangered/Threatened species	6
7	Wildlife wealth	7
8	Wilderness experience	8
9	Autheticity (Nature and Culture)	9
10	Forex and national pride	10

Yes: Explanation for VECs given priority (use additional sheets if necessary)

1 & 2. Increased traffic interfere normal migratory routes
3 & 4. Siltation and sewage disposal pollution
5. Hunting success, mating and breeding behaviour interfered
6. Stress, reduction in number (population)
7. Affect health of vegetation (primary producers), human beings and animals
8 & 9. Genuine vs. Artificial
10. Increased fame and economy (Government revenue collection).

No: Explanation for VECs not given priority (use additional sheets if necessary)

Literature:

Conclusions in plenary

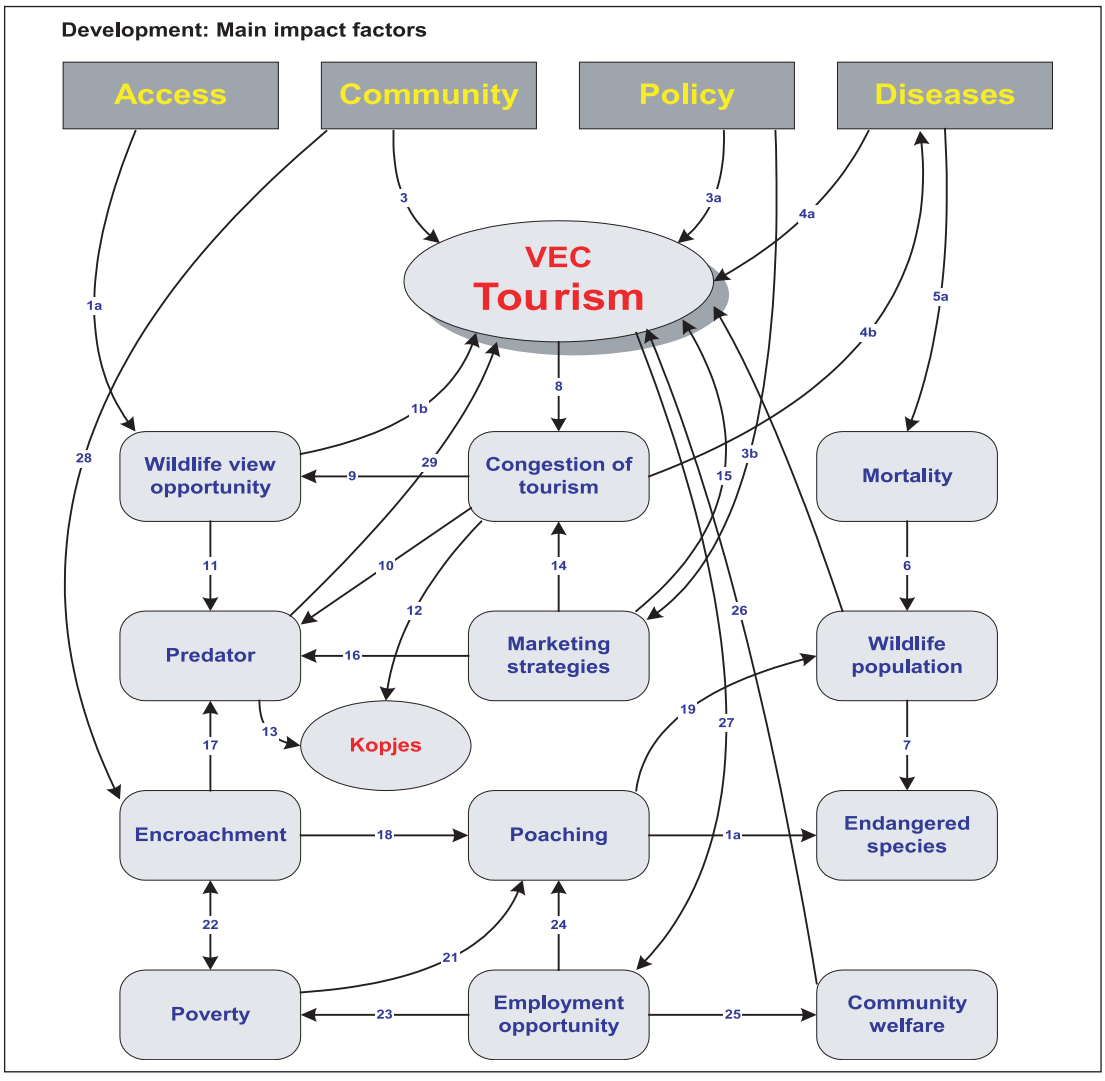
After the group presentations and subsequent discussions in plenary, it was concluded to put emphasis and focus on a limited number of VECs.

Valued Ecosystem Components (VECs) assessed in the discussions	Conclusion: Selected VECs	Priority
Seronera valley	**Seronera valley**	**1**
Wildebeest migration	**Wildebeest Migration**	**2**
Open grasslands/plains	**Ecosystem Health** (plains, woodlands and open grasslands)	**3**
Vegetation mosaic		
Springs, permanent surface water, salt licks	**Water Systems and Catchments**	**5**
Grumeti/Mara river system		
Large predator/prey/population and observation		
Wilderness		
Kopjes	**Kopjes**	**7**
Endangered/Threatened species	**Endangered/Threatened species**	**6**
Ecotourism	**Tourism**	**4**

3. Construction of Schematic Flow Charts

Normally a Schematic Flow Chart is constructed for each of the proposed VECs. Due to limited time resources on the training course, only three flow charts were made, namely for VEC Tourism, VEC Ecosystem health and VEC Wildebeest migration.

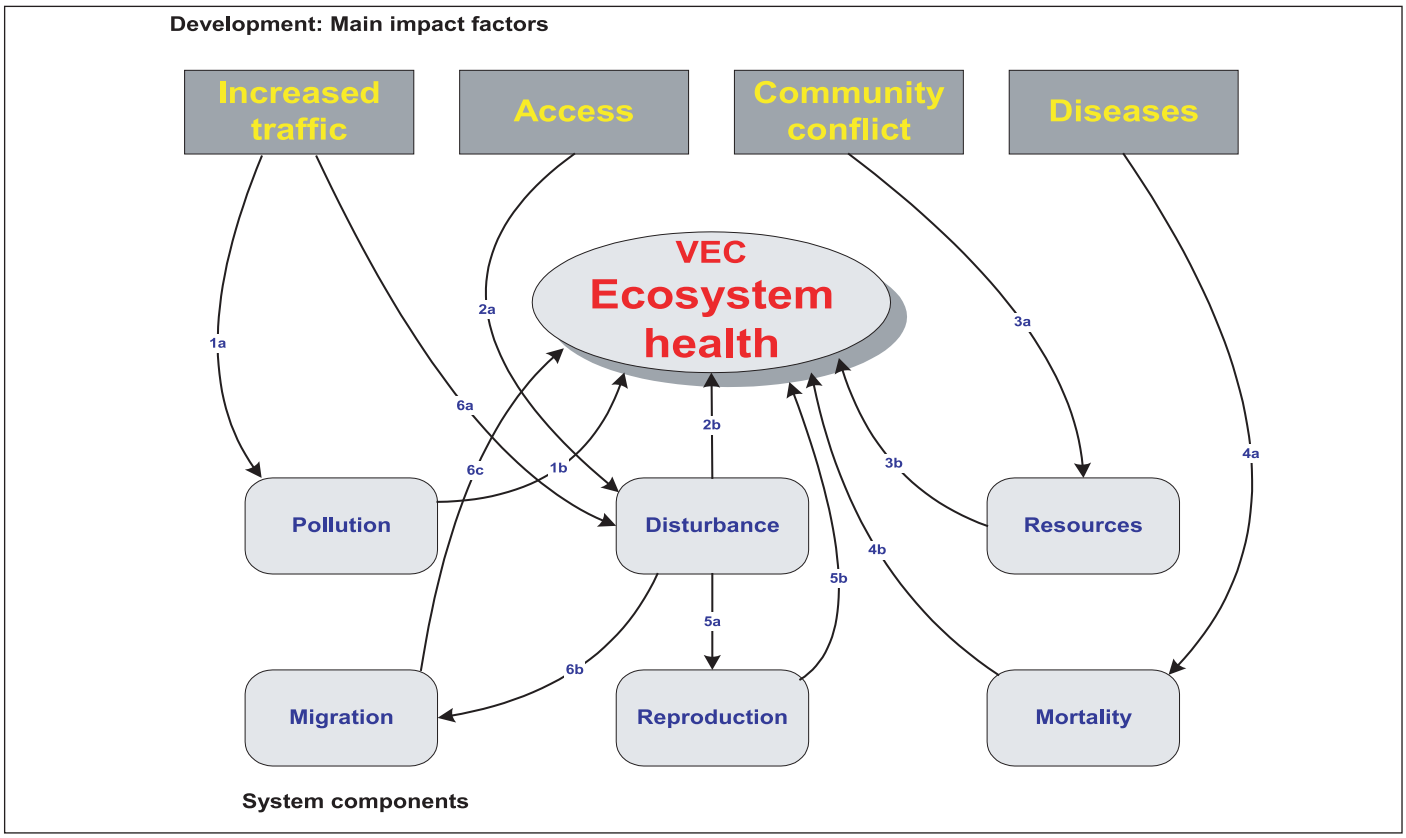
Group no. 1



Explanations to the linkages (VEC: Tourism)

1a	Increased access, increased opportunities for wildlife view
1b	Increased viewing opportunities affect tourism industry
2	Communities generate income from tourism. Similarly tourism contributes to rural development
3a	Good and proper policy boost tourism industry
3b	Good policy attracts more investments, affect marketing strategies which in turn affect tourism industry
4a	Affects tourists and therefore tourism industry
4b	Increases opportunities for disease transmission
5a	Diseases have got direct impact to predators 5b Diseases contributes to wildlife mortality
6	Mortality reduces wildlife population
7	Endangered species are more susceptible
8	Few attractions causes congestion of tourists
9	Chance of viewing wildlife is reduced by congestion
10	Habitat destruction and change in animal behaviour
11	Only few wildlife are interested by tourists, eg. the big five
12	Kopjes harbour many wildlife, therefore attracts more tourists
13	Kopjes are good habitats for predators
14	Good marketing strategies increases number of tourists hence congestion
15	Good marketing strategies increases number of tourists – and tourism industry
16	Marketing strategies causes congestion, this result to change animal behaviour
17	Displacement of habitat
18	Community become more close to PA – increased poaching
19	Decrease in number of animals in turn decrease population
20	Some animals are preferred by poachers – more affected
21	Encourage poaching for subsistence protein
22	Increases encroachment due to demand for biological resources
23	Employment reduces poverty
24	Employment reduces poaching
25	Employment improves welfare to the community
26	Improved welfare improves domestic tourism
27	Tourism creates employment opportunity to community
28	Population growth around PA's increases encroachment
29	Decrease in predator population would affect tourism
30	Decrease in wildlife population would affect tourism

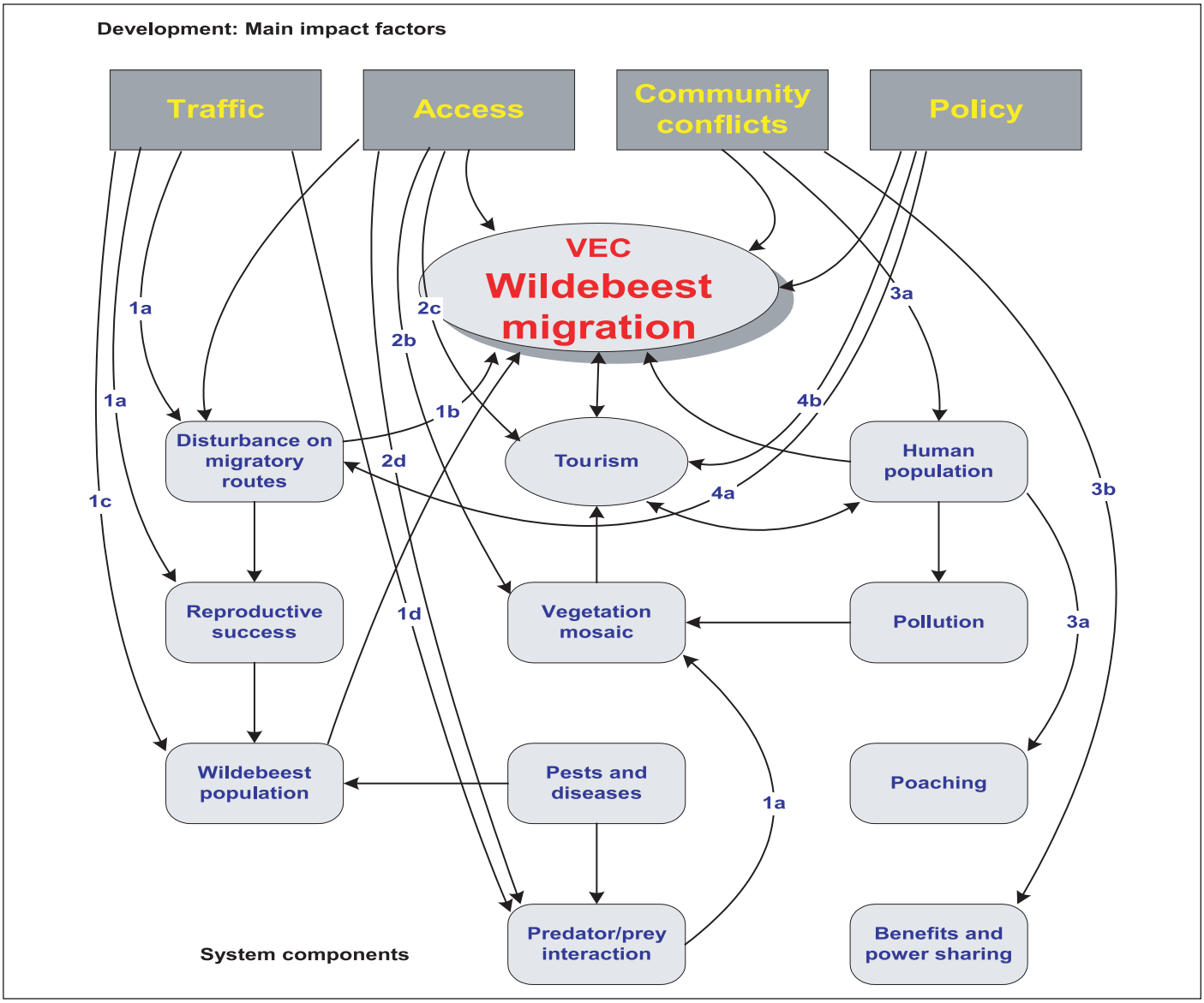
Group no: 2



Explanations to the linkages (VEC: Ecosystem health)

1a	Increased traffic will cause pollution
1b	Pollution will have a negative effect on ecosystem health
2a	Increased access will cause increase in tourist vehicle numbers and lead to disturbance of large predators/prey populations
2b	Disturbance will interfere with behaviour, which lead to low population in the ecosystem
3a	Community population will led to reduction of resources
3b	Reduction of resources will interfere ecosystem functions
4a	Diseases will cause mortality of animals
4b	High mortality will decrease animal population and hence decrease ecosystem health
5a	Disturbance will interfere with reproduction of animals
5b	Interference with reproduction will lead to lower animal numbers in the ecosystem
6a	Increase traffic will cause disturbance to animals
6b	Disturbance to animals will cause disturbance to migratory routes and/or migratory animals

Group no: 3



Explanations to the linkages (VEC: Wildebeest migration)

1a	Increased traffic will cause disturbance on migratory routes and reproductive success
1b	Increased traffic will interfere vegetation mosaics and quality tourism services and facilities
1c	Increased traffic will affect the wildebeest population (increase/decrease)
1d	Increased traffic will cause prey – predator interactions
2a	Increased access will cause disturbance to migratory routes
2b	Increased access will interfere predator – prey interactions
2c	Increased access will promote tourism or will cause congestion of tourists
3a	Increased community conflicts will lead to poaching, and poaching will lead to a decrease in animal population
3b	Increased community conflicts and power sharing lead to increased human population
4a	Introducing new policies or changing existing policies can affect migratory routes between Serengeti N.P. (T2) and Masai Mara national reserve
4b	Change in policies from conservation point of view tourism to a demand driven tourism

4 Impact Hypotheses (IH), evaluation of IHs and recommendations

Group no. 1.

VEC: TOURISM	**IH: no. 1**
Impact hypothesis: Reduction in entry fees into the park will increase the number of tourists	**Impact factor(s):** Accessibility
Explanation: The current entry fees may be inhibiting factor for both domestic and foreign tourism.	
Category: C	
Rationale: Data can be easily collected from the gates by measuring the number of visitors	
Recommended research: The impact of changes in entry fees on the number of tourists.	
Recommended monitoring and/or surveys:	
Recommended management actions: Should they notice that frequently changes in entry fees may be the inhibiting factor for both domestic and foreign tourism.	
Recommended mitigating measures: Before setting entry fees, thorough market survey should be carried and compared with other competitors.	
Reference:	

VEC: TOURISM	**IH: no. 2**
Impact hypothesis: There is strong association between the outbreak of somatic diseases and decline of tourists.	**Impact factor(s):** Diseases
Explanation: With experience zoonatic diseases explosion in the national park do affect negatively the influx of tourists e.g. Sleeping sickness thought to be in the SNP in 2001 affected the tourists influx.	
Category: C	
Rationale: Data can be collected before the outbreak and after, and then compared statistically.	
Recommended research: Impact of the outbreak of zoonatic diseases on the number of tourist.	
Recommended monitoring and/or surveys: Monitoring of ecosystem health should be carried.	
Recommended management actions: Avoid close human-wildlife contact.	
Recommended mitigating measures: Train park staff on wildlife health and diseases.	
Reference: (Kiondo, 2001). The role of veterinary services in wildlife management.	

VEC: TOURISM	**IH: no. 3**
Impact hypothesis: Favourable policy on the tourism industry will improve marketing strategies.	**Impact factor(s):** Policy
Explanation: Tourist operators respond to the government policy and hence affects marketing strategies, which in turn affect tourism industry.	
Category: D	
Rationale: This is a complex scenario that can not easily tested statistically.	
Recommended research:	
Recommended monitoring and/or surveys:	
Recommended management actions: Should advise on the favourable policy.	
Recommended mitigating measures: Policy makers should including stakeholders	
Reference: (Kihwele, 2001).	

VEC: TOURISM	**IH: no. 4**
Impact hypothesis: Domestic tourism in related to household income.	**Impact factor(s):** Community

Explanation: Most people in villages are subsistence farmers who do not produce surplus.

Category: C

Rationale: It is easy to develop the method of testing the income of those local people visiting the park and compared to the average income of common people in the village.

Recommended research: The effect of household income on the domestic tourism.

Recommended monitoring and/or surveys:

Recommended management actions: Management should be aware of the socio-economic and cultural status of the community.

Recommended mitigating measures: Lower park entry fees for domestic tourists.

Reference: (Lowassa, 2000).

VEC: TOURISM	**IH: no. 5**
Impact hypothesis: Increased human activities in the park will affect the predators behaviour.	**Impact factor(s):** Community

Explanation: The more the predators interact with human, the more tanned the predators became and the lesser the flight distance; this may increase the poaching activities.

Category: C

Rationale: Data from the areas with no or negligible human activities can be compared with those detrained from the area with high human activities.

Recommended research: Influence of people on the predators behaviour.

Recommended monitoring and/or surveys: Changes in previously known behavioural pattern.

Recommended management actions: Avoid close contact between human and predators.

Recommended mitigating measures: Train park staff on basic animal behaviour.

Reference: (Grayson, 2002).

VEC: TOURISM	**IH: no. 6**
Impact hypothesis: Poaching of endangered species and/or threaten will have a negative impact on the tourist influx.	**Impact factor(s):** Endangered species

Explanation: Poaching of Rhino has reduced the number almost to zero, in the Serengeti National Park.

Category: C

Rationale: Data can be collected by interviewing the tourist on the preferred species of big game they would like to see.

Recommended research: Understanding tourists preference on specific game animals.

Recommended monitoring and/or surveys:

Recommended management actions: Enforcement of rules and regulations.

Recommended mitigating measures:

- Conservation education for the local community
- Identify the endangered species and strongly taken care off.

Reference: (Nyahongo, 2002).

VEC: TOURISM	**IH: no. 7**
Impact hypothesis: Construction at Lodges on the kopjes will reduce the biodiversity in and around the area.	**Impact factor(s):** Access

Explanation: Many lodges in the Serengeti National Park have been constructed on the kopjes. No body knows the impact of these developmental projects on the biodiversity.

Category: C

Rationale: Data can be collected using biodiversity indices from the kopjes with and without such development.

Recommended research: The effect of lodges construction on biodiversity in and around the kopjes.

Recommended monitoring and/or surveys: Long term monitoring of biodiversity in and around the kopjes.

Recommended management actions: Kopjes environment is sensitive and fragile; hence construction of lodges should avoid such environment.

Recommended mitigating measures: Construction on the kopjes should be avoided and/or well planned.

Reference: (Kihwele, 2002).

VEC: TOURISM	**IH: no. 8**
Impact hypothesis: Biodiversity is high along the tourist roads.	**Impact factor(s):** Access
Explanation: Due to edge effect, biodiversity is always high along the edge of roads.	
Category: C	
Rationale: Collecting data on the edges of roads and far away from the road can statistically test the hypothesis.	
Recommended research: Effect of the tourist road ecology on the biodiversity.	
Recommended monitoring and/or surveys:	
Recommended management actions: Management should review the roads systems in the park.	
Recommended mitigating measures: Reduce road system in order to minimise invasive weeds.	
Reference:	

VEC: TOURISM	**IH: no. 9**
Impact hypothesis: Congestion of tourist around the kopjes reduces the biodiversity.	**Impact factor(s):** Access
Explanation: There is a tendency of more tourists visiting the kopjes as such causing sound pollution movements and approaching the animals. This will drive away those intolerable wildlife species.	
Category: C	
Rationale: Compare less frequently kopjes and more frequently visited kopjes.	
Recommended research: The effect of tourists density in and around the kopjes on the biodiversity.	
Recommended monitoring and/or surveys: Long term monitoring of number of tourists in and around kopjes	
Recommended management actions: The carrying capacity of the kopjes should be taken care off.	
Recommended mitigating measures: Tourists should not exceed the carrying capacity of the kopjes.	
Reference:	

VEC: TOURISM	**IH: no. 10**
Impact hypothesis: Cultural changes in the local community adjacent to tourists routes are related to tourism activities.	**Impact factor(s):** Community
Explanation: Changes in culture is always accelerated by the force of interaction between two or more different cultures from different society.	
Category: C	
Rationale: Note the culture of Maasai who are frequently visited by tourists and those in remote area.	
Recommended research: Impact of tourists on the socio-cultural changes of local community living along the tourist routes.	
Recommended monitoring and/or surveys:	
Recommended management actions: The local people should be educated on the valuable things in their culture which should be retained.	
Recommended mitigating measures:	
Reference:	

Group no. 2

VEC: ECOSYSTEM HEALTH	**IH: no. 1**
Impact hypothesis: Pollution from increased traffic will deter plant photosynthesis and therefore affect ecosystem functioning.	**Impact factor(s):** Increased Traffic
Explanation: Dust and emissions due to increased traffic will interfere with photosynthesis in plants.	
Category: B	
Rationale:	
Recommended research: The hypothesis is valid and already verified. Research to validate the hypothesis is not required.	
Recommended monitoring and/or surveys: Monitoring of redistribution of vehicles in the park to assess the trend of traffic on the attraction points.	
Recommended management actions: • The management of SENAPA should create and advertise other tourism attraction points. • Introduction of booking system during high season will limit the number of vehicle in the park.	
Recommended mitigating measures: Re-distribution of vehicles and diversification of tourism attractions and observation points in the park.	
Reference:	

VEC: ECOSYSTEM HEALTH	**IH: no. 2**
Impact hypothesis: Disturbances caused by increased traffic impairs reproduction success of wildlife.	**Impact factor(s):** Increased Traffic
Explanation: The increased number of tourists will interfere with the mating of animals, this result in low reproduction.	
Category: C	
Rationale:	
Recommended research: Effect of disturbance due to increased traffic on the reproductive success of wildlife should be investigated.	
Recommended monitoring and/or surveys: Not applicable now.	
Recommended management actions: The park authority should come up with a feasible implementable proposal to solve the existing problem.	
Recommended mitigating measures: Not applicable now.	
Reference:	

VEC: ECOSYSTEM HEALTH	**IH: no. 3**
Impact hypothesis: Increased traffic and accessibility will lead into changes in migratory patters.	**Impact factor(s):** Accessibility/ Increased Traffic
Explanation: Most wildebeest will find difficult and risky on the new created routes due to energy consumption and predators.	
Category: C	
Rationale:	
Recommended research: Research to investigate the effect of traffic on migratory patters should be done.	
Recommended monitoring and/or surveys: Note applicable by now.	
Recommended management actions: The park authority should come up with a feasible, implementable proposal pertinent to the research.	
Recommended mitigating measures: Not applicable now.	
Reference:	

VEC: ECOSYSTEM HEALTH	**IH: no. 4**
Impact hypothesis: Disturbances caused by increased tourist vehicles will reduce hunting success of predators.	**Impact factor(s):** Accessibility
Explanation: Noises, from vehicles and increased observation activities will frighten and displace prey, leading to interfaces in the hunting strategies of the predators.	
Category: B	
Rationale:	
Recommended research: The hypothesis is valid and already verified. Research to validate the hypothesis is not is not required.	
Recommended monitoring and/or surveys: Monitoring of redistribution of vehicles in the park to assess the trend of traffic on the attraction points.	
Recommended management actions: The management of SENAPA should create and advertise other tourism attraction points. Introduction of booking system during high season will limit the number of vehicles in the park.	
Recommended mitigating measures: Redistribution of vehicles and diversification of tourism attractions and observation points in the park.	
Reference:	

VEC: **ECOSYSTEM HEALTH**	**IH: no. 5**
Impact hypothesis: Increased human population and conflicts in the periphery of the ecosystem will lead to unsustainable harvesting of resources in the ecosystem.	**Impact factor(s):** Community Conflicts
Explanation: The excessive pressure imposed to the resources due to community conflicts population increase will cause illegal harvesting, which will result to resources depletion on the ecosystem.	
Category: B	
Rationale:	
Recommended research: The hypothesis is valid and already verified. Research to validate the hypothesis is not required.	
Recommended monitoring and/or surveys: Monitoring of the effectiveness of community based conservation (CBC) programmes	
Recommended management actions: Management to put in place the community based conservation (CBC) programme.	
Recommended mitigating measures: Involve the communities in planning and management of resources.	
Reference:	

VEC: **ECOSYSTEM HEALTH**	**IH: no. 6**
Impact hypothesis: Mortality due to diseases will cause population crash in the animal numbers.	**Impact factor(s):** Diseases
Explanation: Diseases cause death of animals and this will lead to a decrease in animal numbers.	
Category: B	
Rationale:	
Recommended research: The hypothesis is valid and already verified. Research to validate the hypothesis is not required.	
Recommended monitoring and/or surveys: Monitoring of the effectiveness of programmes for diseases control and prevention.	
Recommended management actions: The management of SENAPA should institute disease control programmes in the day-to-day conservation endeavours.	
Recommended mitigating measures: Programmes for control and prevention of diseases should be put in place.	
Reference:	

Group no. 3

VEC: **WILDEBEEST MIGRATION**	**IH: no. 1**
Impact hypothesis: Increased traffic may cause disturbance on migratory routes and reproductive success.	**Impact factor(s):** Traffic
Explanation: Increased Traffic has some negative consequences on tourism sustainability.	
Category: C	
Rationale:	
Recommended research: Effect of disturbance on reproductive success.	
Recommended monitoring and/or surveys: Territorial dominance, mating success, number of calves.	
Recommended management actions: Diversify tourism activities to limit number of vehicles along migratory route.	
Recommended mitigating measures: • Introduce strategic plan on viewing tourist attractions in different areas in the ecosystem. • Put emphasis on developing tourist attractions in other National Park	
Reference:	

VEC: **WILDEBEEST MIGRATION**	**IH: no. 2**
Impact hypothesis: Increased Traffic may affect vegetation mosaic and distribution.	**Impact factor(s):** Traffic
Explanation: Changes in vegetation mosaic with ecosystem functions, hence tourism sustainability.	
Category: C	
Rationale:	
Recommended research: Species diversity and abundance.	
Recommended monitoring and/or surveys: • Species diversity and abundance. • Seed dispersal and total biomass.	
Recommended management actions: • Diversity tourism activities • Reduce entrance fee during low season to attract more tourists.	
Recommended mitigating measures: Temporary closure of affected areas.	
Reference: Serengeti II: 1995 Banyikwa, F.F. (2001) reg. Soils and land-use patterns in western Serengeti.	

VEC: **WILDEBEEST MIGRATION**	**IH: no. 3**
Impact hypothesis: Increased Traffic may affect the wildebeest population trends.	**Impact factor(s):** Traffic
Explanation: It is valid but it needs long time and expensive to test.	
Category: B	
Rationale:	
Recommended research:	
Recommended monitoring and/or surveys:	
Recommended management actions:	
Recommended mitigating measures:	
Reference:	

VEC: **WILDEBEEST MIGRATION**	**IH: no. 4**
Impact hypothesis: Increased Traffic may interfere prey/predator interactions.	**Impact factor(s):** Traffic
Explanation: Increased traffic will interfere hunting success for predators and will subject animals of prey to easy predation.	
Category: C	
Rationale:	
Recommended research: The effect of traffic on predatory/prey interactions.	
Recommended monitoring and/or surveys: • Hunting success of predators • Feeding behaviour and flight distance of animals of prey.	
Recommended management actions: Limit number of tourist vehicles on areas where there is high prey/predator interactions.	
Recommended mitigating measures: Refer above management actions.	
Reference:	

VEC: WILDEBEEST MIGRATION	IH: no. 5
Impact hypothesis: Increased access may interfere predator/prey interactions.	**Impact factor(s):** Access

Explanation: Increased access will interfere hunting success for predators and will subject animals of prey to easy predation.

Category: C

Rationale:

Recommended research: Effect of increased tourist circuits on predator/prey interactions.

Recommended monitoring and/or surveys:

- Hunting success of predators
- Feeding behaviour and flight distance of animals of prey.

Recommended management actions: Limit number of tourist vehicles in areas where there is high predator/prey interactions.

Recommended mitigating measures: Refer to Management actions.

Reference:

VEC: WILDEBEEST MIGRATION	IH: no. 6
Impact hypothesis: Provision of CBCS may increase human population around Serengeti ecosystem, which leads to more benefits and power sharing conflicts.	**Impact factor(s):** Community Conflicts

Explanation: Introducing benefits and power sharing demands will cause emergence of claims on the ownership of wildlife resources (Win-Win situation).

Category: B

Rationale:

Recommended research: Research is required on human ecology

Recommended monitoring and/or surveys: Monitoring of populations birth rate and immigration.

Recommended management actions: Establish conservation activities (WMA's).

Recommended mitigating measures: Introduce participatory approach in decision-making around SENAPA.

Reference: SRCP (2001): Programme Annual Report.

ANNEXES

1. An example of work plan and time schedule for conducting EIA based on the AEAM concept

Each group choosed one VEC and developed a time schedule for an EIA study.

Group no: 1

No	Activity		Method/approach	Time schedule (month)												Man mths	Responsi-bility
				1	2	3	4	5	6	7	8	9	10	11	12		
1	**VEC TOURISM**																
	1.1	IH - 1: Domestic tourism is related to the minimum household income	Questionnaire survey among a representative sample of domestic tourists and in the villages					■	■	■						2.5	Amiyo T. Amiyo
	1.2	IH ñ2: Increased human activities in the park will affect the predators behaviour	Three study sites will be identified in the area with high human activities and an area with negligible human activities. Flight distances will be assessed	■	■	■	■	■	■	■	■	■	■	■	■	2	Nyahongo, J.W
	1.3	IH ñ3: Biodiversity is higher along the tourist roads than other areas with similar ecology	10 study sites identified. 5 plots in each site. Site and plots are randomly selected. Different methods and techniques will be employed during the data collection. Biodiversity indices will be calculated from different habitats	■	■	■	■	■	■	■	■	■	■	■	■	4	Mwakalebe, G
Reporting																	
	Monthly progress report																
	Inception report																
	Working papers																
	Mid Term Review																
	Draft EIS																
	Final EIS																

Group no: 2

No	Activity		Method/approach	Time schedule (month)												Man mths	Responsi-bility
				1	2	3	4	5	6	7	8	9	10	11	12		
1	**VEC ECOSYSTEM HEALTH**																
	1.1	IH - 1: Increased traffic and accessibility will lead into changes in migratory patterns	Write a proposal	■												1	Lesio, N.P.
			Identify researchers		■	■	■									1	Lesio, N.P.
			Purchase equipment					■	■	■	■	■	■	■	■	2	Lesio, N.P. TANAPA
			Quantify traffic volume and accessibility													24	Lesio, N.P.
			Determine migratory patterns using radio tracking													24	Lesio, N.P.
Reporting																	
	Monthly progress report																
	Inception report																
	Working papers																
	Mid Term Review																
	Draft EIS																
	Final EIS																

Group no: 3

No	Activity		Method/approach	Time schedule (month)												Man mths	Responsi-bility
				1	2	3	4	5	6	7	8	9	10	11	12		
1	**VEC 1 WILDEBEEST MIGRATION**																
	1.1	IH - 1: Increased traffic may cause disturbance on migration routes and reproductive success	Selection of areas with similar biodiversity; one with high traffic and another with low traffic (control). 1. Change in migratory patterns 2. Change in territorial dominance behaviour 3. Mating success and number of new born calves	■	■	■	■	■	■	■	■	■	■	■	■	18	Angela R. Mwakatobe Time schedule estimated to 24 months (2 years)
Reporting																	
	Monthly progress report						•										
	Inception report														•		
	Working papers																
	Mid Term Review																
	Draft EIS											•					
	Final EIS																

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3. Tentative programme

Environmental Impact Assessment, tentative training programme
(Changes in the tentative programme was done)

Training responsible: Jørn Thomassen, Bjørn Kaltenborn
Training assistant: Kari Helene Bachke Andresen

Monday 22. April

Time	Issues	Responsible
0900-0930	Introduction to EIA: Capacity building in EIA; General principles of EIA	
	EIA in Norway; EIA in other countries	Jørn Thomassen
0930-0945	Status of EIA in Tanzania History, guidelines, legislation etc.	TAWIRI
0945-1000	Break	
1000-1030	The EIA process: Project description, impacts and impact factors, screening procedures, decision makers and relevance, the "good enough" principle, baseline information, scoping, Terms of Reference	Jørn Thomassen
1030-1100	The AEAM concept	Jørn Thomassen
1100-1115	Discussion	
1115-1130	Break	
1130-1210	Tourism – a general overview	Bjørn Kaltenborn
1210-1240	Presentation of case study	Bjørn Kaltenborn
1240-1300	Discussion	
1300-1400	Lunch	
1400-1900	Visit to case study area	Bjørn Kaltenborn/ TANAPA
1900	Dinner	TAWIRI

Tuesday 23. April

Time	Issues	Responsible
0900-0915	Introduction to group works 1, 2 and 3	Jørn Thomassen
0915-1030	Group work 1: Impact factors	All
1030-1045	Break	
1045-1145	Plenary presentation group work 1, conclusions	All
1145-1300	Group work 2: Valued Ecosystem Components (VECs)	All
1300-1400	Lunch	
1400-1445	Plenary presentations group work 2, conclusions	All
1445-1600	Group work 3: Schematic flow charts All	
1600-1615	Break	
1615-1700	Plenary presentations group work 3, conclusions	All
1700-1730	Summing up, discussion	All
1800	Dinner	

Wednesday 24. April

Time	Issues	Responsible
0900-0915	Introduction to group works 4, 5 and 6	Jørn Thomassen
0915-1030	Group work 4: Impact Hypotheses (IHs)	All
1030-1045	Break	
1045-1145	Plenary presentation group work 4, conclusions	All
1145-1300	Group work 5: Evaluation of Impact Hypotheses (IHs)	All
1300-1400	Lunch	
1400-1445	Plenary presentations group work 5, conclusions	All
1445-1600	Group work 6: Recommendations	All
1600-1615	Break	
1615-1700	Plenary presentations group work 6, conclusions	All
1700-1730	Summing up, discussion All	
1800	Dinner	

Thursday 25. April

Time	Issues	Responsible
0900-1000	Accomplishing the job, introduction, work plan, time-price-quality, field work compiling the results, valuing the results, report writing (EIS)	Bjørn Kaltenborn
1000-1115	Group work 7: Preparing a work plan	All
1115-1130	Break	
1130-1215	Plenary presentations, group work 7, conclusions	All
1215-1300	Discussion	
1300-1400	Lunch	
1400-1415	Letter of interest	Jørn Thomassen
1415-1500	Writing a proposal	Bjørn Kaltenborn
1500-1515	Break	
1515-1600	EIA training course reporting, Why, how and when	Bjørn Kaltenborn
1600-1800	Possible future work in connection with NP's in Tanzania	TANAPA
1800	Dinner	

Friday 26. April

Time	Issues	Responsible
0900-1800	Tourism in the Serengeti NP. Summing up the training by site visit. Predictions versus reality.	TANAPA, TAWIRI and Bjørn Kaltenborn
1900	Course dinner	

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